PATENT ABSTRACTS OF JAPAN

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(71)Applicant : MITSUBISHI MOTORS CORP
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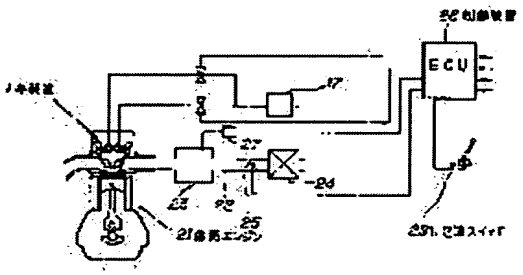
(54) SWITCHING CONTROL METHOD FOR CYLINDER CUT-OFF ENGINE

(57)Abstract:

PURPOSE: To prevent excessive torque generation and reduce switching shock by detecting the gear shift stages and load of a speed change gear when the number of operating cylinders is changed according to speed and load, and switching a cylinder cut-off operating condition and an all-cylinder operating condition on the lower load side at a low speed stage.



CONSTITUTION: A valve device 1 which performs a cylinder cut-off condition at a low speed is disposed at the intake valve of a cylinder cut-off engine 21. The opening degree of a throttle valve 25 which is disposed at an intake tube 22 is detected by a throttle position sensor. Besides, a boost sensor 27 is disposed at a surge tank 23 to detect boost pressure. Besides, a first and second speed stages detecting switch 29 is disposed on the transmission side. The respective detected signals are inputted into a controller 28 respectively. With this constitution, the controller 28 detects the speed and load of the speed change gear. It is thus possible to switch a cylinder cut-off operating condition and an all cylinder operating condition to each other at a low speed stage on the lower load side.

LEGAL STATUS

[Date of request for examination] 28.03.1996
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CLAIMS

[Claim(s)]
[Claim 1] The change control approach of the resting cylinder engine characterized by detecting the gear ratio and load of a change gear, and switching a partial-cylinder-operation condition and all cylinder operational status by the low loading side more in a low-speed stage in the resting cylinder engine into which the number of actuation gas columns was changed according to the rate and the load.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the change control approach of a resting cylinder engine of stopping actuation of a predetermined gas column according to loaded condition etc.
[0002]
[Description of the Prior Art] In the resting cylinder engine made to suspend actuation of a predetermined gas column according to loaded condition etc., if the output output torque with the larger partial cylinder operation is obtained in a certain rotational frequency when throttle opening is small, and throttle opening becomes large, it is known that the output output torque with all larger cylinder operations will be obtained. Therefore, usually performs a change with the partial cylinder operation and all cylinder operations in such a resting cylinder engine with the point (cross point) that the output output torque is equal, by throttle opening, such as the time of partial cylinder operation and all cylinder operations. If it switches at such a point, originally there will be no torque difference and a shock will not occur.
[0003]
[Problem(s) to be Solved by the Invention] However, it does not immediately become the inlet-pipe internal pressure of all gas column demands for the volume of an inhalation-of-air system at the time of the shift to all cylinder operational status from a partial-cylinder-operation condition, namely, the inhalation of air within the pipe one immediately after a change is high, since it will switch after air enters so much, big torque occurs and it appears as a car-body shock through an engine mount, a drive system, and a wheel.
[0004] Although the change gear ratio of a change gear seldom worries the shock by this torque difference in a small high-speed stage (3, 4, 5th speed, etc.), a little torque change influences a car-body shock greatly in the low-speed stage (1 2nd speed) where a change gear ratio is large.
[0005]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, in this invention, in the resting cylinder engine into which the number of actuation gas columns was changed according to the rate and the load, the gear ratio and load of a change gear are detected, and a partial-cylinder-operation condition and all cylinder operational status were switched more by the low loading side in the low-speed stage.
[0006]
[Function] By this approach, since their being low-speed stages, such as the 1st speed and the 2nd speed, and loaded condition are detected, the change point is moved more to a low loading side in a low-speed stage based on it and it was made to perform the change to all cylinder operational status from a partial-cylinder-operation condition, the shock at the time of a change is mitigated.
[0007]
[Example] Next, one example of this invention is explained based on a drawing. The outline of the whole resting cylinder engine is shown in drawing 2 . Although the valve gear 1 to which 21 attains a resting cylinder condition to that inlet valve with a resting cylinder engine at the time of a low speed is formed, this valve gear 1 also has the function for setting up the valve timing in the time of a low speed and a high speed.
[0008] As for the surge tank and 24, the inlet pipe to which 22 makes an inhalation-of-air system,

and 23 are [the air cleaner of an inlet-pipe inlet port and 25] throttle valves, and the opening is detected by the throttle position sensor and inputted into a control unit (ECU) 26. The boost sensor (pressure sensor) 27 is attached in a surge tank 23, boost pressure is detected, and it is inputted into a control unit 26. 29 is 1 and the 2nd speed stage pilot switch which are prepared in the transmission side, for example, ON signal is inputted into a control unit at the time of 1 and the 2nd speed.
[0009] The valve gear adopted by this example is shown in drawing 5 -8. This valve gear 1 is equipped with a cam shaft 2 and a rocker shaft 3, and the cam 5 for high speeds with the cam 4 for low speeds and the amount of large lifts with the amount of small lifts is being fixed to the cam shaft 2.
[0010] And the Maine rocker arm 6 and the subrocker arms 7 and 8 of a pair are formed in the rocker shaft 3.
[0011] The end face is united with the rocker shaft 3 by for example, spline association, and the rocking edge is in contact with the valve-stem end of an inlet valve 9 for the Maine rocker arm 6 mentioned above with association.
[0012] On the other hand, the subrocker arms 7 and 8 are supported pivotably by the rocker shaft 3 in a end face, respectively, and are made pivotable, and the rolling bearing 10 is attached in the rocking edge.
[0013] And in drawing 6 the rocking edge in these subrocker arms 7 and 8 indicate the cam 4 side for low speeds to be , apart from the supporter of a rolling bearing 10 , arm section 7A (8A) can give clockwise rotation energization among drawing in contact with the plunger 13 locate at the tip of the lost motion spring 12 with which it have form and this arm section 7A be prepare in the cylinder head 11 , and the pressure welding of the rolling bearing 10 be carry out to a cam .
[0014] On the other hand, the engagement holes 7B and 8B penetrated towards one side radial [the] bordering on a core are formed in the subrocker arms 7 and 8. That is, these engagement holes 7B and 8B shall have accomplished the **** path of the connection plunger mentioned later.
[0015] Moreover, in the shaft center section, oil pressure path 3A is formed in the interior of a rocker shaft 3 in accordance with shaft orientations, and in the condition of intersecting perpendicularly with oil pressure path 3A, when the base circle of cams 4 and 5 counters the above-mentioned rolling bearing 10, through tube 3B which can make a center position in agreement is formed in the above-mentioned engagement holes 7B and 8B in this oil pressure path 3A, and the location which counters.
[0016] And into this through tube 3B, the connection plunger 14 in which **** is possible is loaded with between this through tube 3B and the engagement holes 7B and 8B mentioned above. Namely, the connection plunger 14 uses as a head the engagement hole 7B [which has been formed in the subrocker arms 7 and 8], and 8B side. for example, the collar formed in the head in the longitudinal direction of through tube 3B mentioned above, and the edge of the opposite side -- by the compression spring 15 arranged between 14A and the supporter in a rocker shaft 3 Usually, the position in which it sometimes turns caudad, it is energized and a head is absorbed towards the inside of through tube 3B from the engagement holes 7B and 8B is set up.
[0017] On the other hand, the output way 31 of the oil pressure setting means 16 is connected to oil pressure path 3A in the rocker shaft 3 mentioned above. a thing for this oil pressure setting means 16 to set up the pressure in oil pressure path 3A mentioned above according to operational status -- it is -- the electromagnetism a low speed and for high speeds -- it has the drive type directional selecting valves 16A and 16B, and these change-over valves 16A and 16B are controlled by said control unit 26.
[0018] electromagnetism -- in the case of this example, drive type directional-selecting-valve 16A is arranged at two paths the object for low speeds, and for high speeds, respectively, each change-over valves 16A and 16B have three locations of the path from an oil pump 17, the feedback loop which is having atmospheric pressure open pressure discharge set up, and oil pressure path 3A in a rocker shaft 3, and the oil from an oil pump 17 is having the position which is not excited and which is introduced to the feedback loop usually set up sometimes in addition, the electromagnetism located in the high-speed side in drawing 8 -- illustration is omitted about drive type directional-selecting-valve 16A. Therefore, since the pressure within oil pressure path 3A is maintained by the low condition, the connection plunger 14 is made into the condition of having escaped from the

engagement holes 7B and 8B by energization of a compression spring 15 as shown in drawing 7 .
[0019] O2 for [on the other hand] an engine speed sensor and air-fuel ratio detection in a control device 26 the electromagnetism which the information from the various sensors for operational status detection including a sensor and the throttle position sensor for loaded-condition detection is inputted, distinguishes loaded condition in a low-speed condition and a high-speed condition list according to the input from each [these] sensor, and is located in the both sides of a low speed and a high speed -- the driving signal to drive type directional-selecting-valve 16A is outputted. therefore, electromagnetism -- if drive type directional-selecting-valve 16A is excited, the oil from an oil pump 17 will be supplied to oil pressure path 3A, and the pressure in the path will be heightened.
[0020] thus, the electromagnetism located in a low-speed side when it is distinguished by the input of an engine speed, an air-fuel ratio, and accelerator opening in a control device 26 that it is in a comparatively low speed condition, since it is constituted -- the electromagnetism which a drive type directional selecting valve is excited, and is located in a high-speed side -- a drive type directional selecting valve is usually set as a position.
[0021] the electromagnetism by the side of the low speed mentioned above -- the electromagnetism which drive type directional-selecting-valve 16A is excited, and switches to the position which turns the oil from an oil pump 17 to oil pressure path 3A, and feeds it, and is located in a high-speed side -- a drive type directional selecting valve has the position which maintains an initial position by not being excited and does not supply the oil into oil pressure path 3A by the side of a high speed maintained
[0022] Therefore, the connection plunger 14 located in a low-speed side As a two-dot chain line shows drawing 7 , resist energization of a compression spring 15, project towards engagement hole 7A of the 1st subrocker arm 7, and a rocker shaft 3 and the 1st subrocker arm 7 are unified. It enables it to perform closing motion control of the valve by the cam 4 for low speeds by making transfer of the driving force between the subrocker arm 7 and a rocker shaft 3 into ******. Moreover, as a continuous line shows the connection plunger 14 by the side of a high speed in drawing 7 R> 7 Transfer of the driving force between the 2nd subrocker arm 8 and rocker shafts 3 which it is supposed that have been absorbed in through tube 3B of a rocker shaft 3, and are located in a high-speed side is maintained to a disconnection state, and it is made for an operation of closing motion control of the valve by the cam 5 for high speeds to have not reached.
[0023] the electromagnetism in the time of the low speed mentioned above on the other hand when rotation of an engine went up and the high-speed rotation region was arrived at -- the electromagnetism located in a high-speed side contrary to an excitation setup to the drive type directional selecting valves 16A and 16B -- an excitation setup to the drive type directional selecting valves 16A and 16B is performed. Therefore, in this case, as a two-dot chain line shows drawing 7 , a rocker shaft 3 and the 2nd subrocker arm 8 are unified because the connection plunger 14 located in a high-speed side projects towards engagement hole 8B of the 2nd subrocker arm 8, and transfer of the driving force between the 2nd subrocker arm 8 and rocker shafts 3 which are located in a high-speed side is set as ******. In addition, the connection plunger 14 by the side of a low speed is changed into the position which escapes from engagement hole 3A of the 1st subrocker arm 7, and is absorbed in through tube 3B of a rocker shaft 3 at this time. Consequently, closing motion control of the valve by the cam 5 for high speeds will be performed.
[0024] Moreover, when it is distinguished that operation in the low loading condition, such as an idling, is performed by the input from a throttle position sensor at the time of the low speed mentioned above, the closing motion control by the cam by the side of the low speed and high speed in the selected gas column is made not to be performed. namely, the electromagnetism located in a low-speed and high-speed side in a control unit 26 in this condition -- an excitation setup to a drive type directional selecting valve is canceled.
[0025] therefore, which electromagnetism by the side of a low speed and a high speed, since the feeding position of the oil by the drive type directional selecting valves 16A and 16B is not set up The pressure in oil pressure path 3A of a rocker shaft 3 does not rise. By this The connection plunger 14 of each ** is set as the usual position absorbed in through tube 3B by energization of a compression spring 15, and maintains transfer of the driving force between the 1st and 2nd subrocker arm 7 and 8 and a rocker shaft 3 to a disconnection state by it. Each subrocker arms 7 and 8 are made

into the so-called valve idle state which does not act the closing motion control by the object for low speeds, and the cams 4 and 5 for high speeds, and have a resting cylinder condition set up here by this. And this resting cylinder condition is changed to a setup of the actuation position of the connection plunger 14 according to an engine speed, when a low loading condition is canceled.
[0026] When a change gear is in 1 and the low-speed stage of the 2nd speed, the change to all cylinder operational status from the above-mentioned resting cylinder condition is made by the low loading side in order to mitigate a change shock. Therefore, the map B which shifted more the change point other than the change judging map A at the times other than 1 as shown in drawing 3 , and a 2nd speed stage to the low loading side is created beforehand. In addition, a load is represented with the boost pressure measured by the above-mentioned boost sensor 27, and an engine speed is taken along an axis of abscissa, and it has taken boost pressure along the axis of ordinate.
[0027] Next, if a resting cylinder / all cylinder change control are explained, as shown in drawing 1 , an engine speed and boost pressure will be detected first and, subsequently it will be judged for 1 of a change gear, and the 2nd speed stage pilot switch 29 whether it is ON. Since it is not in 1 and a 2nd speed condition when judged as NO, based on Map A, a change with a partial-cylinder-operation condition and all cylinder operational status is made.
[0028] When it is judged that 1 and the 2nd speed stage pilot switch 29 are ON, based on the map B which shifted the change point to the low loading side more, a change with a partial-cylinder-operation condition and all cylinder operational status is made. Since it is switched more by the low loading side, a change shock is reduced.
[0029] Although loaded condition is seen by boost pressure, you may make it judge with the element of others, such as an inhalation air content over an engine speed, in this example. Moreover, a valve gear 1 is also an example and the other devices which a resting cylinder condition can attain can also be adopted.
[0030]
[Effect of the Invention] Since according to the all the cylinders / the resting cylinder change control approach of the resting cylinder engine concerning this invention all resting cylinder cylinders were switched more at the time of low loading when a change gear was in a low-speed stage, generating of excessive torque can be prevented and a change shock is mitigated.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the flow chart which shows one example of this invention.
[Drawing 2] It is the schematic diagram of the whole resting cylinder engine system.
[Drawing 3] They are all the resting cylinder cylinder change judging maps at the times other than 1 and the 2nd speed.
[Drawing 4] They are 1 and all the resting cylinder cylinder change judging maps at the time of the 2nd speed.
[Drawing 5] It is the important section perspective view of a valve gear.
[Drawing 6] It is the important section sectional view of drawing 5 .
[Drawing 7] It is the sectional view which met in the direction of an axis of the rocker shaft of drawing 5 .
[Drawing 8] It is the block diagram of an oil pressure setting means.
[Drawing 9] It is the graph which shows the cross point of all cylinder resting cylinders.
[Description of Notations]
1 Valve Gear
21 Resting Cylinder Engine
26 Control Unit
27 Boost Sensor
29 1, 2nd Speed Stage Pilot Switch

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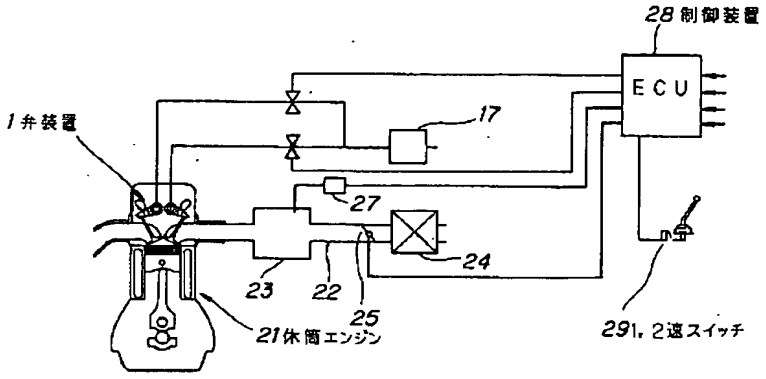
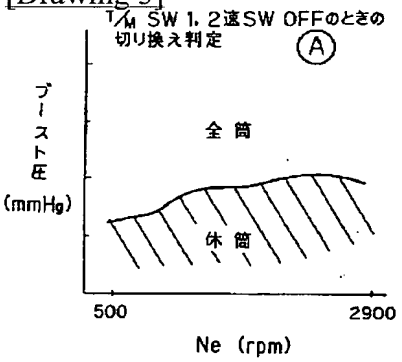
DRAWINGS

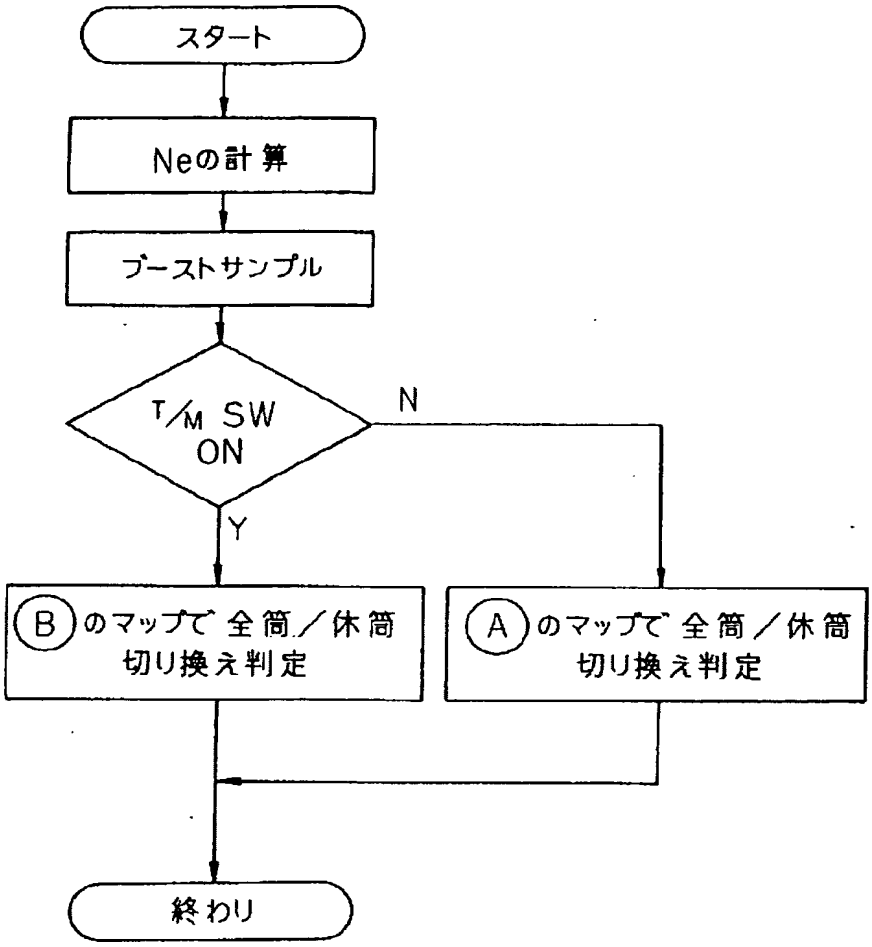
[Drawing 2]



[Drawing 3]



[Drawing 1]



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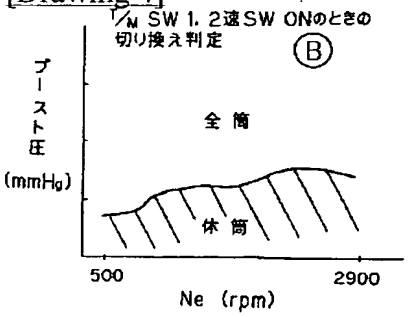

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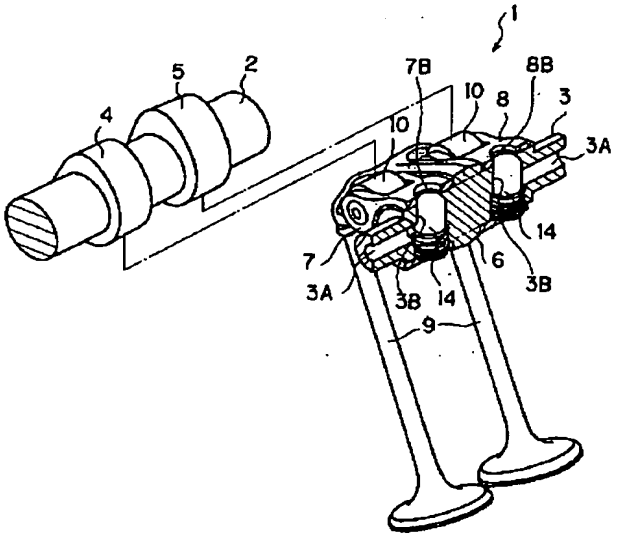

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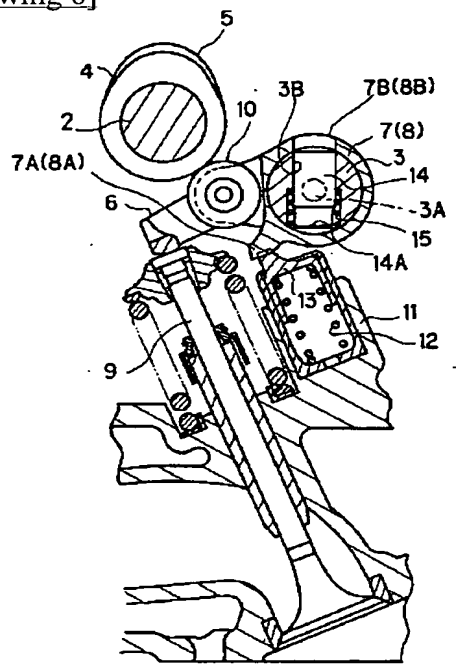
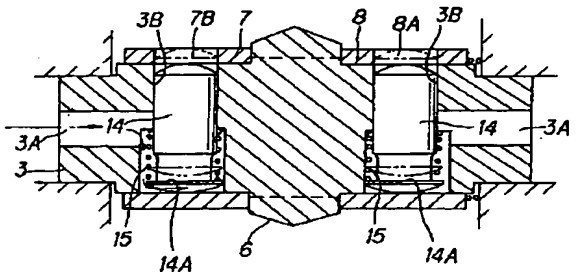
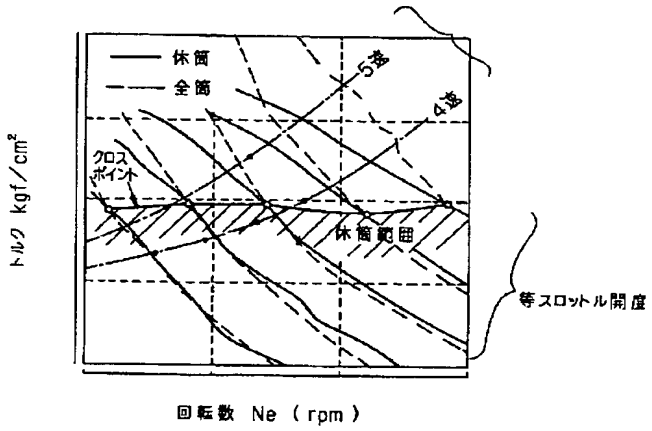


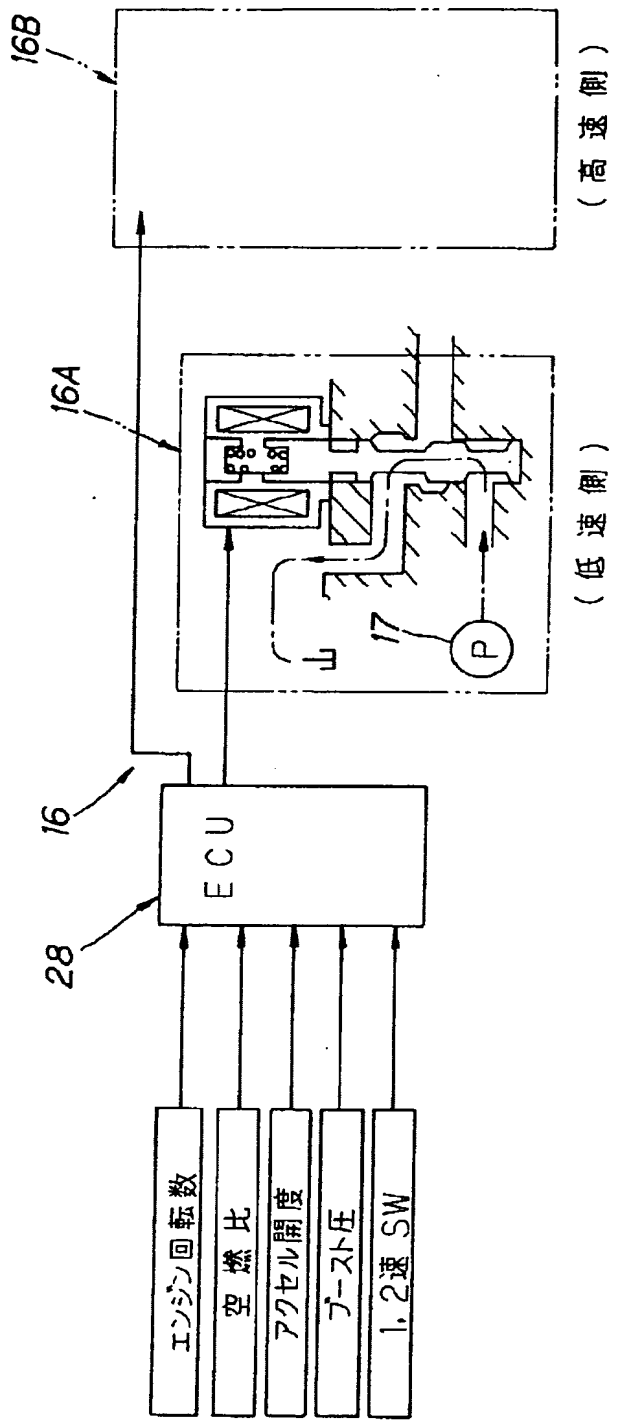
[Drawing 7]



[Drawing 9]



[Drawing 8]



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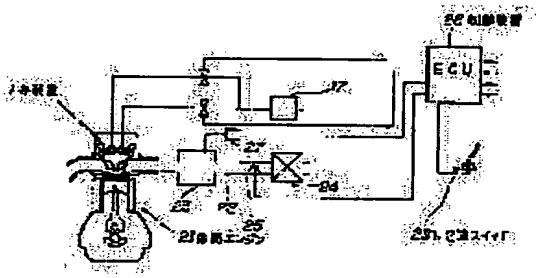
CONSTITUTION: A valve device 1 which performs a cylinder cut-off condition at a low speed is disposed at the intake valve of a cylinder cut-off engine 21. The opening degree of a throttle valve 25 which is disposed at an intake tube 22 is detected by a throttle position sensor. Besides, a boost sensor 27 is disposed at a surge tank 23 to detect boost pressure. Besides, a first and second speed stages detecting switch 29 is disposed on the transmission side. The respective detected signals are inputted into a controller 28 respectively. With this constitution, the controller 28 detects the speed and load of the speed change gear. It is thus possible to switch a cylinder cut-off operating condition and an all cylinder operating condition to each other at a low speed stage on the lower load side.



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(43)公開日　平成5年(1993)10月19日

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		303	C		
F02D	17/02		M 7367－3G		

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(21)出願番号　特願平4-68238

(22)出願日　平成4年(1992)3月26日

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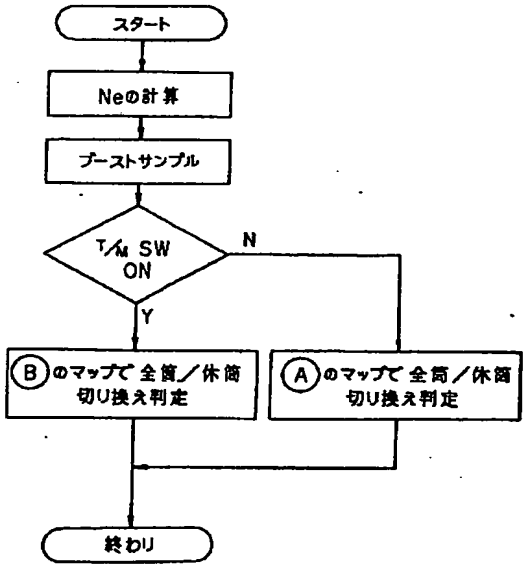
(74)代理人　弁理士　光石　俊郎　(外1名)

(54)【発明の名称】休筒エンジンの切換え制御方法

(57)【要約】
【目的】　休筒エンジンにおいて、低速段における休筒全筒切換え時のショックを低減する。
【構成】　変速機に設けた1，2速段検出スイッチ29により1，2速段であるかどうか判断し、1，2速段であるときには、休筒運転状態と全筒運転状態との切換えポイントを低負荷側にずらし、切換え時のショックを低減した。



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【特許請求の範囲】

【請求項１】　速度及び負荷に応じて作動気筒数を変えるようにした休筒エンジンにおいて、変速機の変速段及び負荷を検出し、低速段ではより低負荷側で休筒運転状態と全筒運転状態とを切換えるようにしたことを特徴とする休筒エンジンの切換え制御方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、負荷状態等に応じて所定の気筒の作動を停止させる休筒エンジンの切換え制御方法に関する。

【０００２】

【従来の技術】負荷状態等に応じて所定の気筒の作動を停止させる休筒エンジンにおいては、ある回転数においてスロットル開度が小さいときには休筒運転の方が大きい出力軸トルクが得られ、スロットル開度が大きくなると全筒運転の方が大きい出力軸トルクが得られることが知られている。したがって、このような休筒エンジンにおける休筒運転と全筒運転との切換えは、休筒運転時と全筒運転時の等スロットル開度で出力軸トルクが等しい点（クロスポイント）で行うのが通例である。このような点で切換えれば、本来トルク差がなくショックが発生しない。

【０００３】

【発明が解決しようとする課題】しかし、休筒運転状態から全筒運転状態への移行時、吸気系の容積のため、すぐには全気筒要求の吸気管内圧にならず、即ち切換え直後の吸気管内は高く、多量に空気が入ってから切換わることになるから、大きなトルクが発生し、それがエンジンマウント、駆動系、車輪を通じて車体ショックとして現われる。

【０００４】このトルク差によるショックは、変速機の変速比が小さい高速段（３，４，５速など）ではあまり気にならないが、変速比が大きい低速段（１，２速）では、少しのトルク変化が車体ショックに大きく影響する。

【０００５】

【課題を解決するための手段】上記課題を解決するため、本発明では、速度及び負荷に応じて作動気筒数を変えるようにした休筒エンジンにおいて、変速機の変速段及び負荷を検出し、低速段ではより低負荷側で休筒運転状態と全筒運転状態とを切換えるようにしたのである。

【０００６】

【作用】この方法では、１速、２速などの低速段であること及び負荷状態を検出し、それに基づき低速段ではより低負荷側に切換えポイントを移して休筒運転状態から全筒運転状態への切換えを行うようにしたので、切換え時のショックが軽減される。

【０００７】

【実施例】次に、本発明の一実施例を図面に基づき説明

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する。図２には休筒エンジン全体の概略を示してある。２１が休筒エンジンで、その吸気弁に対しては、低速時に休筒状態を達成する弁装置１が設けられているが、この弁装置１は、低速，高速時での弁開閉時期を設定するための機能も有している。

【０００８】２２は吸気系をなす吸気管、２３はそのサージタンク、２４は吸気管入口のエアクリーナ、２５はスロットルバルブで、その開度はスロットルポジションセンサにより検出され、制御装置（ＥＣＵ）２６に入力される。サージタンク２３にはブーストセンサ（圧力センサ）２７が取付けられ、ブースト圧が検出され、制御装置２６に入力される。２９はトランスミッション側に設けられている１，２速段検出スイッチで、例えば１，２速のときにＯＮ信号が制御装置に入力される。

【０００９】本実施例で採用している弁装置は図５～８に示されている。この弁装置１は、カムシャフト２とロッカーシャフト３とを備え、カムシャフト２には、小リフト量をもつ低速用カム４および大リフト量をもつ高速用カム５とが固定されている。

【００１０】そして、ロッカーシャフト３には、メインロッカーアーム６と一対のサブロッカーアーム７，８とが設けてある。

【００１１】上述したメインロッカーアーム６は、例えばスプライン結合によって基端がロッカーシャフト３と一体化されており、揺動端は例えば、吸気弁９のバルブステムエンドに当接している。

【００１２】一方、サブロッカーアーム７，８は、それぞれ基端をロッカーシャフト３に枢支されて回転可能とされており、揺動端にはローラーベアリング１０が取り付けてある。

【００１３】そして、このサブロッカーアーム７，８における揺動端は、低速用カム４側を示している図６において、ローラーベアリング１０の支持部とは別にアーム部７Ａ（８Ａ）が形成してあり、このアーム部７Ａはシリンダヘッド１１に設けてあるロストモーションスプリング１２の先端に位置するプランジャ１３に当接して図中、時計方向の回転付勢を与えられ、ローラーベアリング１０をカムに圧接させるようになっている。

【００１４】一方、サブロッカーアーム７，８には、中心部を境にしてその半径方向の一方に向け貫通する係合孔７Ｂ，８Ｂが形成してある。すなわち、この係合孔７Ｂ，８Ｂは、後述する連結プランジャの突没通路を成すものとされている。

【００１５】また、ロッカーシャフト３の内部には、軸中心部において軸方向に沿って油圧通路３Ａが形成されており、この油圧通路３Ａにおける上記係合孔７Ｂ，８Ｂと対向する位置には、油圧通路３Ａと直交する状態で、カム４，５のベース円が上記ローラーベアリング１０に対向したときに中心位置を一致させることのできる貫通孔３Ｂが形成してある。

【００１６】そして、この貫通孔３Ｂ内には、この貫通孔３Ｂと上述した係合孔７Ｂ，８Ｂとの間を突没可能な連結プランジャ１４が装填されている。すなわち、連結プランジャ１４は、サブロッカーアーム７，８に形成してある係合孔７Ｂ，８Ｂ側を頭部とし、例えば、上述した貫通孔３Ｂの長手方向における頭部と反対側の端部に形成された鍔１４Ａとロッカーシャフト３内の支持部との間に配置された圧縮バネ１５によって、通常時には下方に向け付勢されて頭部が係合孔７Ｂ，８Ｂから貫通孔３Ｂ内に向け没入する態位を設定されている。

【００１７】一方、上述したロッカーシャフト３内の油圧通路３Ａには、油圧設定手段１６の出力路３１が接続してある。この油圧設定手段１６は運転状態に応じて上述した油圧通路３Ａ内の圧力を設定するためのものであり、低速・高速用の電磁駆動式方向切換弁１６Ａ，１６Ｂを備え、これらの切換弁１６Ａ，１６Ｂが前記制御装置２６により制御される。

【００１８】電磁駆動式方向切換弁１６Ａは、本実施例の場合、低速用と高速用との２経路にそれぞれ配置されており、各切換弁１６Ａ，１６Ｂはオイルポンプ１７からの通路と大気圧開放圧を設定されている帰還路とロッカーシャフト３内の油圧通路３Ａとの３位置をもち、励磁されない通常時にはオイルポンプ１７からのオイルが帰還路へ導入される態位を設定されている。なお、図８中、高速側に位置する電磁駆動式方向切換弁１６Ａについては図示を省略してある。従って、油圧通路３Ａ内での圧力は低い状態に維持されるので、連結プランジャ１４は、圧縮バネ１５の付勢によって、図７に示すように係合孔７Ｂ，８Ｂから脱した状態とされる。

【００１９】一方、制御装置２６には、エンジン回転数センサ、空燃比検出用のO_2センサ、負荷状態検出用のスロットルポジションセンサを始めとする運転状態検出用の各種センサからの情報が入力されており、これら各センサからの入力に応じて低速状態および高速状態並びに負荷状態を判別して低速、高速の両側に位置している電磁駆動式方向切換弁１６Ａへの駆動信号を出力する。従って、電磁駆動式方向切換弁１６Ａが励磁されると、オイルポンプ１７からのオイルが油圧通路３Ａに供給されてその通路内の圧力が高められる。

【００２０】このように構成されるため、制御装置２６において、エンジン回転数、空燃比およびアクセル開度の入力情報により、比較的低速な状態であることを判別した場合は、低速側に位置する電磁駆動式方向切換弁が励磁され、また高速側に位置する電磁駆動式方向切換弁は通常態位に設定される。

【００２１】上述した低速側の電磁駆動式方向切換弁１６Ａは、励磁されることで、オイルポンプ１７からのオイルを油圧通路３Ａに向け圧送する態位に切換られ、また、高速側に位置する電磁駆動式方向切換弁は励磁されないことで初期態位を維持して高速側の油圧通路３Ａ内

へのオイルの供給を行わない態位を維持される。

【００２２】従って、低速側に位置する連結プランジャ１４は、図７において二点鎖線で示すように、圧縮バネ１５の付勢に抗して第１のサブロッカーアーム７の係合孔７Ａに向け突出してロッカーシャフト３と第１のサブロッカーアーム７とを一体化し、サブロッカーアーム７とロッカーシャフト３との間の駆動力の伝達を接状態とされることで低速用カム４による弁の開閉制御が行えるようにし、また、高速側での連結プランジャ１４は、図７において実線で示すように、ロッカーシャフト３の貫通孔３Ｂ内に没入したままとされて高速側に位置する第２のサブロッカーアーム８とロッカーシャフト３との間の駆動力の伝達を断状態に維持して、高速用カム５による弁の開閉制御の作用が及ばないようにしてある。

【００２３】一方、エンジンの回転が上昇して高速回転域に達すると、上述した低速時での電磁駆動式方向切換弁１６Ａ，１６Ｂに対する励磁設定とは逆に、高速側に位置する電磁駆動式方向切換弁１６Ａ，１６Ｂに対する励磁設定が行われる。従って、この場合には、図７において二点鎖線で示すように、高速側に位置する連結プランジャ１４が、第２のサブロッカーアーム８の係合孔８Ｂに向けて突出することでロッカーシャフト３と第２のサブロッカーアーム８とを一体化し、高速側に位置する第２のサブロッカーアーム８とロッカーシャフト３との間の駆動力の伝達を接状態に設定する。なお、このとき、低速側の連結プランジャ１４は第１のサブロッカーアーム７の係合孔３Ａから脱してロッカーシャフト３の貫通孔３Ｂ内に没入する態位に変換される。この結果、高速用カム５による弁の開閉制御が行われることになる。

【００２４】また、上述した低速時において、例えば、スロットルポジションセンサからの入力により、アイドリング等の低負荷状態での運転が行われていることを判別した場合には、選択された気筒における低速・高速側のカムによる開閉制御を行わないようにされる。すなわち、この状態においては、制御装置２６において、低速側および高速側に位置する電磁駆動式方向切換弁に対する励磁設定が解除される。

【００２５】従って、低速側および高速側のいずれの電磁駆動式方向切換弁１６Ａ，１６Ｂによるオイルの圧送態位が設定されないので、ロッカーシャフト３の油圧通路３Ａ内の圧力は上昇せず、これによって、各側の連結プランジャ１４が圧縮バネ１５の付勢によって貫通孔３Ｂ内に没入する通常態位に設定され、第１、第２のサブロッカーアーム７，８とロッカーシャフト３との間の駆動力の伝達を断状態に維持する。これにより、各サブロッカーアーム７，８は低速用、高速用カム４，５による開閉制御を作用されない所謂、弁停止状態とされ、ここに、休筒状態を設定されることになる。そして、この休筒状態は、低負荷状態が解除された時点でエンジン回転

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数に応じた連結プランジャ１４の作動態位の設定に切り替えられる。

【００２６】変速機が１，２速の低速段にあるときには、上記休筒状態から全筒運転状態への切換えは、切換えショックを軽減するためより低負荷側でなされる。そのため、図３に示すような１，２速段以外のときの切換え判定マップＡのほかに、切換えポイントをより低負荷側にシフトさせたマップＢを予め作成しておく。なお、負荷は、前述のブーストセンサ２７で測定するブースト圧で代表させ、横軸に回転数、縦軸にブースト圧をとってある。

【００２７】次に、休筒／全筒切換え制御について説明すると、図１に示すように、先ずエンジン回転数、ブースト圧が検出され、次いで、変速機の１，２速段検出スイッチ２９がＯＮか否かが判断される。ＮＯと判断された場合は、１，２速状態ではないので、マップＡに基づき休筒運転状態と全筒運転状態との切換えがなされる。

【００２８】１，２速段検出スイッチ２９がＯＮであると判断された場合は、切換えポイントをより低負荷側にずらしたマップＢに基づき休筒運転状態と全筒運転状態との切換えがなされる。より低負荷側で切換えられるので、切換えショックは低減される。

【００２９】この実施例では、負荷状態をブースト圧で見ているが、エンジン回転数に対する吸入空気量などその他の要素により判断するようにしてもよい。また、弁装置１も一例であり、休筒状態が達成できるその他の機構も採用できる。

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【００３０】

【発明の効果】本発明に係る休筒エンジンの全筒／休筒切換え制御方法によれば、変速機が低速段にあるときには、より低負荷のときに休筒全筒を切換えるようにしたので、過大トルクの発生が防止でき、切換えショックが軽減される。

【図面の簡単な説明】

【図１】本発明の一実施例を示すフローチャートである。

【図２】休筒エンジンシステム全体の概略図である。

【図３】１，２速以外のときの休筒全筒切換え判定マップである。

【図４】１，２速のときの休筒全筒切換え判定マップである。

【図５】弁装置の要部斜視図である。

【図６】図５の要部断面図である。

【図７】図５のロッカーシャフトの軸線方向に沿った断面図である。

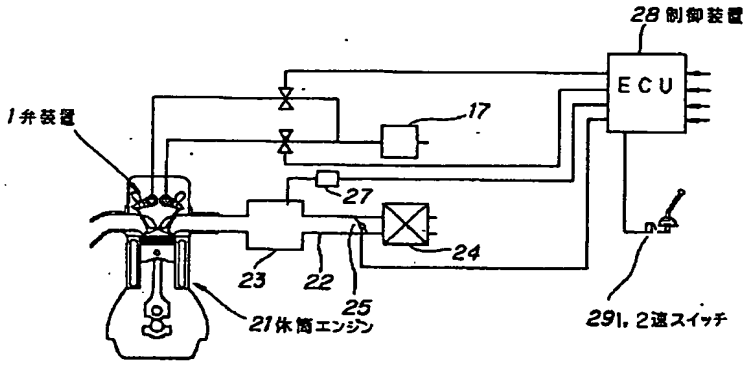
【図８】油圧設定手段のブロック図である。

【図９】全筒休筒のクロスポイントを示すグラフである。

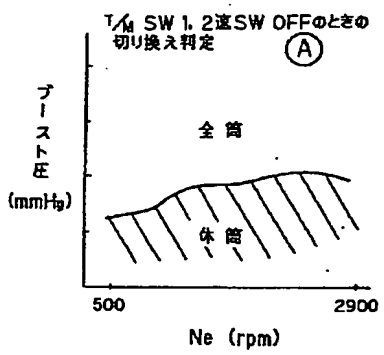
【符号の説明】

１　弁装置
２１　休筒エンジン
２６　制御装置
２７　ブーストセンサ
２９　１，２速段検出スイッチ

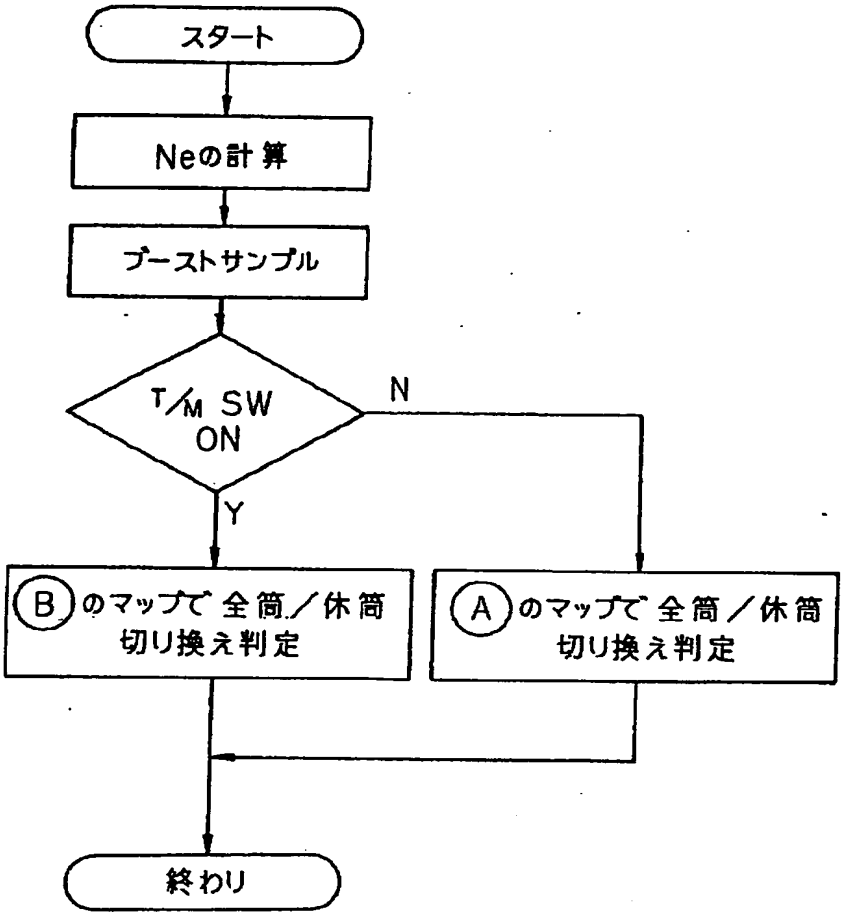
【図２】



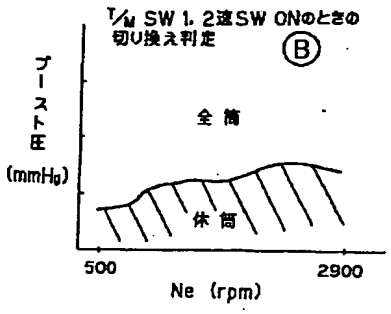
【図３】



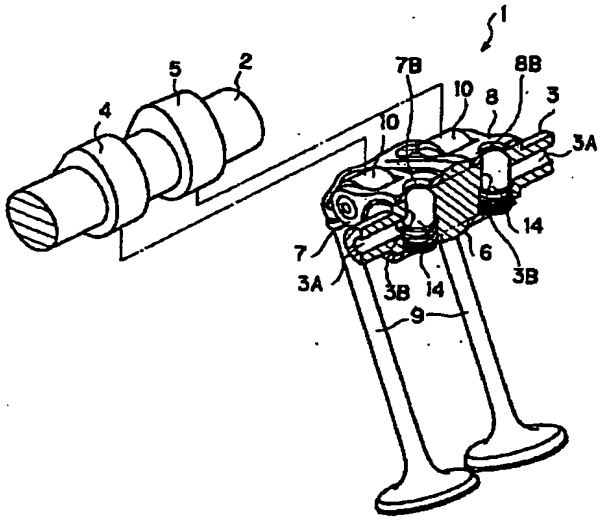
【図１】


スタート
Neの計算
ブーストサンプル
T/M SW ON
N
Y
Ⓑのマップで全筒／休筒切り換え判定
Ⓐのマップで全筒／休筒切り換え判定
終わり

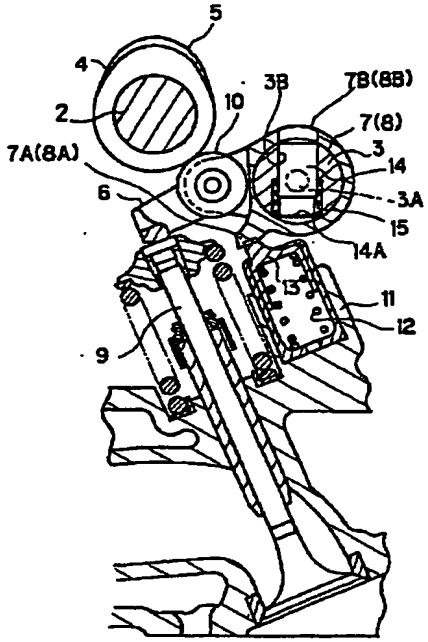
【図４】


T/M SW 1, 2速SW ONのときの切り換え判定 Ⓑ
全筒
休筒
ブースト圧 (mmHg)
500
2900
Ne (rpm)

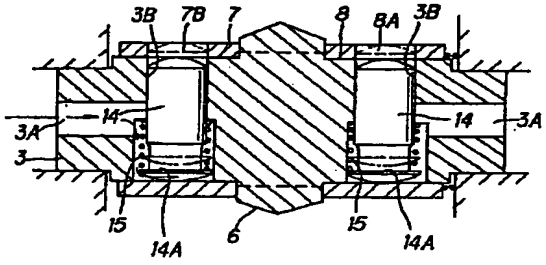
【図５】


1
2
3
3A
4
5
6
7
7B
8
8B
9
10
14
3B

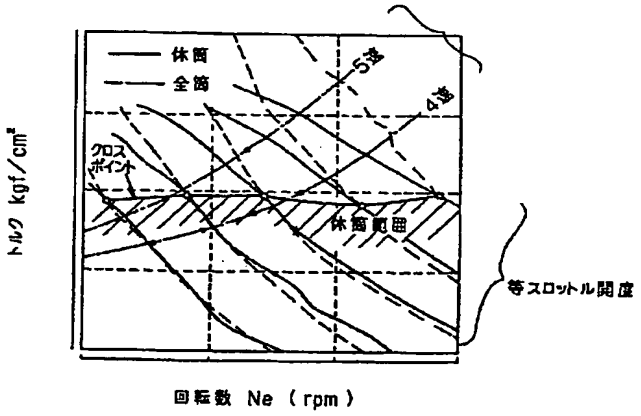
【図６】


2
3
3A
3B
4
5
6
7(8)
7A(8A)
7B(8B)
9
10
11
12
13
14
14A
15

【図７】


3
3A
3B
6
7
7B
8
8A
14
14A
15

【図９】


休筒
全筒
5速
4速
クロスポイント
休筒範囲
等スロットル開度
トルク kgf/cm²
回転数 Ne（rpm）

【図8】